RESEARCH

Implementation Science



Assessing the comparative effectiveness of ECHO and coaching implementation strategies in a jail/provider MOUD implementation trial



Todd Molfenter^{1*}, Jessica Vechinski¹, Jee-Seon Kim², Jingru Zhang², Lionel Meng², Jessica Tveit¹, Lynn Madden^{3,4} and Faye S. Taxman⁵

Abstract

Background For nearly two decades, it has been widely recognized that individuals in jail settings have a high prevalence of opioid use disorders (OUD) and are highly susceptible to fatal overdose upon their release. This setting provides a public health opportunity to address OUD with Medication for Opioid Use Disorders (MOUDs). Yet, 56% of jails do not provide MOUD, creating a pressing need for better implementation approaches in jail and the hand-off to the community. Two successful implementation strategies, NIATx external coaching and the Extension for Community Healthcare Outcomes (ECHO) case management telementoring model, were compared to address this persistent treatment gap.

Methods This 2×2 design compared high (n = 12) and low (n = 4) dose coaching with and without ECHO in a 12-month intervention and 12 M sustainability period. The national trial included 25 jails and 13 community-based partners. MOUD trends for buprenorphine, methadone, injectable naltrexone, and combined MOUD between the study arms were assessed.

Results Jail sizes ranged from 24% with < 100 and 24% with > 500 daily population, and community-based treatment providers ranged from 63% with < 50 and 7% with > 500 average monthly OUD intakes. New patient counts were found to significantly increase across the intervention phase for buprenorphine (p < .01) and combined MOUD (p < .01). Injectable naltrexone and methadone showed no consistent, significant gains. For sites with low coaching without ECHO, new patient counts for combined MOUD were predicted to increase by 47.44% during the intervention phase and 7.30% during the sustainability phase. ECHO demonstrated that MOUD use did not significantly increase compared to coaching across MOUDs in the intervention phase (p = .517). High- and low-dose coaching showed no significant differences in MOUD use during the intervention phase (p = .124).

Conclusions Coaching emerged as a more effective implementation strategy than ECHO for increasing buprenorphine use in jail settings. In practice, ECHO sessions offered considerable overlap with coaching strategies. While high-dose coaching had greater gains for MOUDs overall than low-dose coaching, those gains were statistically insignificant, suggesting low-dose coaching to be more economical. To increase MOUD use in jail settings, jurisdictions should focus on new MOUDs so all three MOUDs are available and enhance the post-incarceration continuum of care.

*Correspondence: Todd Molfenter todd.molfenter@wisc.edu Full list of author information is available at the end of the article



© The Author(s) 2025. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/4.0/.

Trial registration Name of registry: ClinicalTrials.gov.

Trial registration number: NCT04363320.

Date of registration: 2020–07-30.

URL of trial registry record: https://clinicaltrials.gov/study/NCT04363320?term=molfenter&rank=7.

Keywords External Coaching, ECHO, Implementation Strategies, Medications for Opioid Use Disorders (MOUDs), Jails, Criminal Legal Settings, Buprenorphine, NIATx

Contributions to the literature

- Individuals in jail settings face a high risk of fatal overdoses upon release—a critical issue recognized for nearly two decades but lacking effective solutions.
- Two popular approaches to implementation were tested to gain insights into this persistent treatment gap: coaching (high and low dose) and the Extension for Community Healthcare Outcomes (ECHO) case management telementoring model.
- Coaching emerged as the most effective approach for increasing buprenorphine use, with low-dose coaching not performing significantly different from high-dose coaching, suggesting a cost-effective solution for juris-dictions seeking to improve post-release outcomes.

Background

The majority of the 1.9 million individuals sentenced to jails and prisons in the United States yearly meet the criteria for drug dependence or use [1, 2]. In states with the highest rates of opioid overdose deaths, 22% of individuals entering jail settings screened positive for opioid use disorder (OUD) [3]. Three FDA-approved medications for opioid use disorder (MOUD) treatment-methadone, buprenorphine, and naltrexone-are considered the gold standard for treating OUD in general and with criminal justice populations [4, 5]. Yet, a large treatment gap exists, with just 44% of incarcerated individuals having access to MOUD, and often only for a limited subset of the incarcerated population [6]. Moreover, justice settings seldom include structures to support individuals with OUD as they transition into the community and engage in medication-based treatments. This is particularly important given that the risk of death within the first two weeks post-release is more than 12 times higher than for individuals with OUD in the general population [7]. The leading cause of death is often a fatal overdose resulting from a loss of tolerance after abstinence during incarceration [8]. Overall, there is an implementation opportunity of considerable public health importance to expand use of MOUD in incarcerated settings and during the transition back to the community. While both jails and prisons are important in MOUD care, jails offer a greater public health opportunity due to their local control, short-term stays, high turnover, and nearly 11 million admissions annually, resulting in more frequent individual contact than longer-term state prisons.

The implementation gap in administering MOUD in jail settings encounters a set of barriers, including the stigmatization of substance use disorders [9-11], funding for MOUD [10, 12, 13], institutional design [12, 14], leadership support [14, 15], policy and administrative procedures [16, 17], availability and capacity of community-based treatment providers [14], and communication barriers regarding MOUD's effectiveness at achieving public safety and personal recovery [17, 18]. Jails often lack staff to screen for OUD, conduct case management, provide behavioral treatment, and engage in discharge planning. Similarly, community providers also lack resources and staff to work with jails on reentry [19]. As a result, despite the significant need for greater MOUD use in these settings, significant barriers to implementation persist, creating a dangerous implementation gap [20]. Effective implementation strategies to address this public health need are necessary to provide MOUD pharmacotherapy to this population. Two implementation strategies with evidence for successful evidence-based innovation (EBI) implementation and MOUD adoption are NIATx organizational coaching [21] and Extension for Community Healthcare Outcomes (ECHO) [22, 23].

ECHO (Extension for Community Healthcare Outcomes)

Is an implementation strategy that builds clinician capacity to adopt and perform evidence-based innovation (EBI). The model begins with intensive didactic training in a particular subject, followed by a series of tele-video sessions where each session includes a mix of didactic materials and case conferencing to address issues that clinical staff must navigate, followed by a question-and-answer session with participating clinicians and subject matter experts. The ECHO implementation strategy has considerable support for improving clinician knowledge [24–26]. There have also been demonstrations where the ECHO model has led to greater use of pharmacotherapies [27, 28]. Yet, there are trials where ECHO improves medical knowledge but does not lead to improvements in practice [29, 30]. What remains unknown is whether ECHO is effective in justice settings, where challenges often involve balancing security with treatment, addressing service delivery issues, and identifying the clinical practice improvements needed in these environments.

NIATx external organizational coaching

With its focus on goal setting, has proven to be an implementation strategy for addressing barriers and implementing innovations [31-33]. Organizational coaching involves training and support on change management, guiding participants on how to effectively implement the targeted EBI [34]. However, coaching effectiveness in justice settings remains understudied and underutilized. In cases where it has been explored, little is known about which types and intensities of coaching can most effectively improve reach and integration within the system [35, 36], thereby increasing MOUD use for justice-involved clients. In an experiment, Taxman et al. [37] found that post-training coaching was more effective when it focused on social support and developing internal expertise. In the general organizational literature, the frequency and amount of coaching have yet to be widely tested across implementation settings.

These two implementation strategies were part of a comparative effectiveness trial to study the impact of MOUD use in jail and post-jail community-based treatment provider (CBTP) settings. This paper details the procedures and findings for this large, randomized trial conducted in 48 jails and CBTPs to determine the optimal combination of coaching and ECHO implementation strategies. The coaching intervention employed the NIATx process improvement model as a change management framework [32, 36], and the ECHO model used an altered approach [25] where sessions occurred monthly rather than weekly. The format of the sessions and the faculty panel in the sessions were similar. The implementation effectiveness trial had four study arms that compared low-dose and high-dose NIATx coaching, with and without ECHO, to increase access to OUD medications. The study hypothesized that sites assigned to the study arm involving high-dose NIATx coaching and ECHO would be most successful in implementing or expanding MOUD use. High-dose NIATx coaching, supported by existing evidence in non-justice settings [38], focuses on organizational change. ECHO aims to enhance the MOUD providers' knowledge and self-efficacy to increase confidence in using MOUD [39].

Methods

Study setting

The study was performed in a national sample of county jails and jail clusters, including jail sites and any community-based treatment provider (CBTP) site(s) the jails collaborate with. Jails were typically in countybased incarceration settings with temporary confinement stays for unsentenced or shorter-term sentenced individuals, compared to state- and federal-based prisons where individuals serve longer-term felony convictions. The community-based providers typically specialize in addiction and/or behavioral health care.

Subject recruitment and sample

The primary target of recruitment efforts was jails seeking technical assistance to implement or expand MOUD practices within their sites and/or to increase MOUD use post-incarceration. When a jail joined the study, the site was encouraged to invite the local CBTP site(s) they worked with to join the study. Although beneficial, it was not mandatory for the jail to include a CBTP. Jails were recruited by a variety of methods, including networking and distributing promotional materials through national networks such as the Justice Community Opioid Innovation Network (JCOIN) and the Bureau of Justice Assistance (BJA), accessing state databases of jails and cold-calling, and outreach to national organizations such as the National Sheriffs Association, American Jail Association, and Council of State Government's Justice Policy Center, and social media. Diversity and representation were considered based on factors like population size, geographic location, and gender to achieve a broader representation of jails and CBTPs.

Study design

Sites were randomly assigned to one of four study arms: 1) High-Dose NIATx Coaching & ECHO, 2) Low-Dose NIATx Coaching & ECHO, 3) High-Dose NIATx Coaching Only, and 4) Low-Dose NIATx Coaching Only. High dosage refers to 12 monthly coaching calls, whereas low dosage had four calls or one per quarter (See Table 1). Coaching and ECHO were provided over 12 months with a 12-month follow-up phase to measure the sustainability of the implementation strategies. The study had three cohorts (Cohorts A, B, and C) of Jails and CBTPs that rolled out over an 18-month period.

Table 1 Overview of the NIATx and ECHO coaching

| | 5 | |
|---------------------------------|---|--|
| ARM | NIATx Coach | ECHO |
| High-Dose NIATx Coaching & ECHO | Four-hour, virtual kick-off Meeting^a split into two days with study team & coaches 12 monthly (one-hour) coaching calls with change leader/team | • Clinicians participated in 12 monthly (one-hour) scheduled video confer- ence calls |
| Low-Dose NIATx Coaching & ECHO | Four-hour, virtual kick-Off meeting^a split into two days with study team & coaches Four (one-hour) coaching calls at months 1, 4, 8, and 12 with change leader/team | Clinicians participated in 12 monthly (one-hour) scheduled video confer- ence calls |
| High-Dose NIATx Coaching Only | Four-hour, virtual kick-Off meeting ^a split into two days with study team & coaches 12 monthly (one-hour) coaching calls with change leader/team | Not Offered |

Four-hour, virtual kick-off meeting^a split into two days with study team & coaches

• Four (one-hour) coaching calls at months 1, 4, 8, and 12 with change leader/team

^a The Kick-Off Meetings were originally planned as in-person events but were restructured to be held virtually due to COVID-19

Four coaching approaches in the NIATx and ECHO programs, showing variations in meeting frequency and use or absence of ECHO video calls. All approaches featured a virtual kick-off meeting

NIATx external organizational coaching

Low-Dose NIATx Coaching Only

To provide adequate NIATx coaching and availability for all 48 sites, six trained NIATx coaches were recruited to provide coaching and technical assistance. Selected coaches are experts in MOUD implementation and organizational change, all with at least 15 years of experience providing NIATx coaching. A coach was assigned to each jail, and the 0-5 CBTPs associated with the jail during the 12-month intervention phase. Coach calls were one hour long, recorded, and held virtually via Zoom, quarterly or monthly, based on arm assignment. Communication was kept to a minimum between each coaching call to compare high and low-dose coaching outcomes, with only email exchanges pertaining to logistics of calls allowed. Each call was semi-structured and led by the coach. A site would provide an update on its process improvement project(s) and progress made on its plan-do-study-act (PDSA) cycle, an iterative problemsolving model for carrying out change. The coach then provided guidance and feedback and determined the steps to be taken before the next scheduled call. Each call included the coach, the change leader, and, on average, 2-4 change team members. After each coach call, the coach completed a tracking document detailing meeting attendance, topics discussed, and action steps to improve MOUD. In addition, coaches met with the study team monthly to discuss site progress and to address any barriers.

The coaching model elements [34] common to both the low-dose and high-dose arms were: 1) baseline education on change management and implementation for the targeted EBI, 2) nearly all sites developed a project charter with an aim statement and associated specific, measurable, achievable, relevant and time-bound goals, 3) adherence to a pre-set evidence-based change model that stimulated successful change and facilitated the coaching function, 4) the use of Plan-Do-Study-Act change cycles and pilot tests to promote change, 5) data tracking for performance, 6) coach motivational support for EBI implementation, and 7) the scheduled coaching sessions with implied accountability for reporting EBI implementation activities.

Not Offered

ECHO

ECHO sessions were one hour long and held monthly via Zoom. Sessions were facilitated by an expert panel of four addiction medicine physicians, one health management specialist specializing in MOUD within correctional settings, and an expert in recovery, advocacy, and programming for mental & behavioral health who was also a person in long-term recovery. Each session included introductions, a 20-min presentation on topics related to clinical aspects of MOUD within correctional settings, and a Q&A. The last 30 min allowed study participants to submit case studies and receive input from the expert panel and other attendees. Participants included those from sites in either the High-Dose Coaching & ECHO or the Low-Dose Coaching & ECHO arms. One to three individuals from each site participated in the sessions, typically holding roles such as physician, nurse practitioner, RN, medical director, or MOUD program manager. To maintain fidelity, Cohort B and C received identical presentations in the same format and timeline as Cohort A.

Study randomization

This study employed a randomized block design, where a 2×2 factorial design was implemented within each block of four homogeneous sites. The blocks were defined

based on whether the jail had a CBTP (as part of the jail-CBTP combination), the county's population where the jail was located, and whether or not the jail was providing MOUD to justice-involved populations at baseline. Each jail and CBTP were assigned to the same intervention arm and were treated as distinct sites as each was operated by its unique policies and procedures and had its own change team. This block design ensured a balanced representation of sites of n = 12 sites per arm, for a total of n = 48, based on the characteristics mentioned above, helping to reduce variability in MOUD patient counts due to potential confounding. However, due to attrition of n = 10 sites during the study, not all blocks maintained representation from each of the four treatment arms, and blocks were not included in the analysis. The attrition was with one jail and one associated CBTP provider per arm $(n=2\times4=8)$ and two additional CBTP sites (n-2). In each instance where a CBTP dropped without the associated jail, there was another CBTP associated with that jail. As a result, the pattern of attrition was considered similar across the four treatment conditions, and comparability between conditions was still deemed viable. Attrition was primarily due to COVID-19 and the demands of the pandemic on the jail.

Implementation procedures *Change teams*

Each participating site was asked to identify an executive sponsor, change leader, and change team. The executive sponsor represents their respective jail or CBTP site, typically as director, Chief Executive Officer (CEO), sheriff, or warden. The executive sponsor identifies a "change leader" or "site liaison" (someone in a management role) who coordinates the study components. The Executive Sponsor and Change Leader identified up to seven staff members as part of a "change team." Members of the change team held a variety of positions, including criminal justice staff (jail or probation), health provider representatives, medical providers/prescribers (i.e., nurse, physician), counselors, and other stakeholders to ensure that the team's reach was extended to various pertinent audiences. With guidance and technical assistance from their assigned NIATx coach, the change teams worked on quality process improvement projects using PDSA cycles to implement or improve MOUD practices and policies based on the study aim(s) the site identified at the start of the study. An aim is a specific, measurable, achievable, relevant, and time-bound goal. Some sites had one aim during the entire study, whereas others identified two or three aims throughout. Examples of site aims include increasing the number of OUD screenings, setting up an opioid treatment program (OTP) within the jail, adding buprenorphine inductions to the existing MOUD program, transitioning from Suboxone to Sublocade to improve efficiencies, including staff time & diversion, and increasing the number of individuals who connect with a community MOUD provider. These change team members represented their jail or CBTP in the study and were ultimately the change makers. Together, they identified their site's specific needs, created goals, and delegated their process improvement project responsibilities to colleagues for implementation. These teams were essentially responsible for the potential improvement of MOUD at their site.

NIATx coaches

Six trained NIATx coaches provided coaching and technical assistance. The coaches attended ten hours of virtual training and workgroup sessions to ensure the standardization of study protocol and coaching practices.

Study phases

The study had three phases. Phase 1 was exploration, where the executive sponsor, change leader, and change team members from each study site participated in two study onboarding video conferences with the research team. Each site's change team also engaged in pre-study workgroup processes, including a walk-through and flow-charting exercise, and prioritized issues regarding MOUD use in their jurisdiction. Phase 2, the intervention phase, began with sites participating in two two-hour virtual kick-off meetings that covered NIATx methods, MOUD implementation promising practices, and receiving assistance from their NIATx coach to identify their site's study aim(s) and develop their change project charter. During Phase 2, the coaches met with their teams per the assigned arm, as described in Table #1. The coach collected implementation data to gauge the team's progress. If a site was assigned to two of the four study arms that included ECHO, the clinician(s) on the change team concurrently attended monthly ECHO sessions. Phase 3, the sustainability phase, involved monitoring the use of MOUD and the goal(s) selected by the site. Phase 1 and 2 occurred during months 1-12 "intervention" period, while Phase 3 occurred in months 13-24.

Study timeline

The study occurred across three cohorts, with three staggered start dates: Cohort A – February 2021 (n=18 sites), Cohort B – August 2021 (n=12 sites), and Cohort C – February 2022 (n=18 sites).

Study measures

A modified survey from the National Jail Survey developed by Chestnut Health Systems documented the characteristics and practices of the jails and CBTPs [40]. Jail characteristics included geographic location (rural, suburban, urban), gender served (male, female, both), number of admissions, type of healthcare model (direct, contracted, hybrid), and MOUD offered at baseline (buprenorphine/naloxone, naltrexone, injectable naltrexone, methadone). CBTP characteristics were geographic location (rural, suburban, urban), gender served (male, female, both), number of monthly intakes, arrangement with jail (written agreement, joint staffings, EHR access for jail, referral processes), and MOUDs offered at baseline (buprenorphine/naloxone, naltrexone, injectable naltrexone, methadone).

Jail and CBTP organizational characteristics were collected through a baseline "organizational" survey administered by a secure web-based platform. The MOUD utilization counts were collected monthly for 24 months (12-month intervention & 12-month sustainability) from jail and CBTP sites using a spreadsheet template. Captured data for the jails and CBTPs included MOUD treatment data, the number of individuals screened, the number of individuals identified with OUD, the number referred for OUD, the number of individuals receiving MOUD, the number of individuals who received naltrexone, buprenorphine, and methadone (by *new* and *census* counts), the number of injections, and the number referred to MOUD care post-release.

Primary outcome

The primary outcome was new patients placed on MOUD during a given month. However, both new and census data results were often reported as some sites could only provide *new* data counts, and others could only provide census data counts due to their data tracking systems. Census was the total number of patients who received MOUD in a month. This included those on a regimen for more than a month in the jail setting and new patients who began the MOUD regimen. In the analysis of n=38 sites, n=2 sites had *new-only* counts, n=3 sites had *census-only* counts, and n=33 provided both. The rates and frequency of MOUD use (buprenorphine, methadone, and injectable naltrexone) were measured monthly repeatedly for 24 months, consisting of a 12-month intervention phase followed by a 12-month sustainability phase.

Data analysis

Linear mixed-effects models were applied to account for random site effects, as well as the fixed effects of intervention conditions and time (month) on patient counts placed on MOUD separately for each phase (intervention and sustainability). This approach estimated patterns and rates of change over time.

Power analysis

A power analysis was conducted based on two previous studies implementing NIATx Coaching and ECHO on similar populations [41], reporting an effect size of Cohen's d=0.51 for High vs. Low-dose Coaching [25], finding significant effects of ECHO, including a tenfold increase in buprenorphine-waivered physicians. For the power analysis, 32 of the 38 sites reported the primary outcome of new patients placed on MOUD for a power between 0.75 and 0.89. Additionally, 30 sites reported census numbers for a power range of 0.76 to 0.90 to detect the intervention's effect on this measure.

Results

The study included n=25 jails and n=13 CBPT for n=38 total sites by the end of the study, with 2–3 sites dropping from each arm. There was a dispersed mix of rural (29% n=11), suburban (26% n=10) and urban jail (45% n=17) settings. The jail size annual admissions ranged from <100 (24% n=6), 101–500 (52% n=13), and >500 (24% n=6); and 3) jail health care delivery models included direct (24% n=6), contracted (48% n=12), and hybrid (28% n=7) (Table 2). At baseline, at least 52% of jail and CBTP sites were providing injectable naltrexone and 68% buprenorphine/naloxone.

The number of sites located in each study arm were High-Dose NIATx Coaching & ECHO (n=9), Low-Dose NIATx Coaching & ECHO (n=10), High-Dose NIATx Coaching Only (n=9), and Low-Dose NIATx Coaching Only (n=10). The site counts for each arm for *New* and *Census* data during the intervention phase ranged from 4-10, with an average of 7.5 sites per arm per specific MOUD type (Table 3). The combined MOUD outcome is a summed aggregation of any MOUD used by a site, regardless of type. *New* data counts refer to new patients placed on MOUD during a given month, and *census* is the total number of patients who received MOUD in a month; those who were on regimen for more than a month in the jail setting and new patients that began MOUD regimen.

Table 4 provides the average monthly changes in MOUD patient counts for each MOUD outcome (combined MOUD, buprenorphine, methadone, and naltrexone). For sites in the least intensive technical assistance arm of sites with low coaching without ECHO, new patient counts for combined MOUD were predicted to increase by 47.44 percentage points ((annual estimated change+predicted baseline intercept/predicted baseline intercept) -1*100) over the course of the intervention

Table 2 Jail & CBTP Characteristics

| | | Jail (N=25) | CBPT (N=13) |
|--|---------------------------|-------------|-------------|
| Geographic Location | Rural | 36% (9) | 15% (2) |
| | Suburban | 24% (6) | 31% (4) |
| | Urban | 40% (10) | 54% (7) |
| Gender Served | Male | 4% (1) | - |
| | Female | - | - |
| | Both | 96% (24) | 100% (13) |
| Average Daily Population (Jail) | < 100 | 24% (6) | NA |
| | 101–250 | 32% (8) | NA |
| | 251–500 | 20% (5) | NA |
| | >500 | 24% (6) | NA |
| Avg Monthly OUD Intakes (Community Provider) | < 50 | NA | 63% (8) |
| | 51–200 | NA | 23% (3) |
| | 201–500 | NA | 7% (1) |
| | >500 | NA | 7% (1) |
| Type of Healthcare Model (at jail) | Direct | 24% (6) | NA |
| | Contracted | 48% (12) | NA |
| | Hybrid | 28% (7) | NA |
| Arrangements with Jail | Joint Staffings | NA | 38% (5) |
| | Shared Written Agreements | NA | 62% (8) |
| | EHR Access | NA | 23% (3) |
| | Referral Processes | NA | 69% (9) |
| MOUD Offered (at Baseline) | Buprenorphine/Naloxone | 68% (17) | 92% (12) |
| - Not Mutually Exclusive | Naltrexone (injectable) | 52% (13) | 85% (11) |
| | Naltrexone (oral) | 28% (7) | 77% (10) |
| | Methadone | 60% (15) | 15% (2) |
| | | 4%(1) | 0% (0) |

Comparative overview of characteristics between jails (N=25) and community-based treatment providers (CBTP) (N=13), detailing geographic location, gender served, average daily population, intake levels, and types of MOUD offered at baseline

phase and 7.30 percentage points over the course of the sustainability phase. Census patient counts for combined MOUD in the low coaching without ECHO sites grew similarly, by 48.37 percentage points over the course of the intervention phase and 10.23 percentage points over the course of the sustainability phase. For combined MOUD, the average monthly increase in the new patient count was significantly predicted to be 0.538 (p=0.002) in the intervention phase. Buprenorphine average monthly increase in patient count was significantly predicted to be 0.380 (p<0.001) in the intervention phase and 0.642 (p<0.001) in the sustainability phase.

The *census* outcome at the bottom of Table 4 showed similar patterns, though with slightly different results in terms of statistical significance. For combined MOUD, average monthly increase in patient count was significantly predicted to be 1.912 (p < 0.001) during the intervention phase, and 0.617 (p = 0.045) during the sustainability phase. For buprenorphine, average monthly increase in patient count was again significantly predicted at 0.855 (p < 0.001) in the intervention phase and

1.103 (p < 0.001) in the sustainability phase. For naltrexone, average monthly increase in patient count was significantly predicted to be 0.073 (p = 0.020) during the intervention phase and 0.086 (p = 0.019) during the sustainability phase.

For the combined MOUD outcome, further analyses were conducted to investigate three contrasts: the High and Low Coaching contrast compares the relative effectiveness of low versus high dosage of coaching; the ECHO and no ECHO contrast compares implementation strategies with and without ECHO; the Jails w/ CBTP and Jails w/o CBTP contrast examines whether having a CBPT makes a difference. Results for these comparative effectiveness investigations for both the new and census measures are presented in Table 5 below. No statistically significant differences were found in the three contrasts, indicating that low-dose coaching, no-Echo, and the absence of CBTP did not differ significantly in terms of New Counts of MOUD. However, higher counts of MOUD were observed in

Table 3 Descriptive statistics

| Intervention | Phase (Monthly | y Means & San | nple Sizes) | | |
|---------------|----------------|---------------|---------------|-------------|--|
| New Counts of | of MOUD | | | | |
| | Low Coachin | g | High Coaching | | |
| | ECHO | No ECHO | ECHO | No ECHO | |
| Buprenor- | 3.00 | 17.43 | 21.79 | 5.01 | |
| phine | (sd 4.05) | (sd 25.56) | (sd 28.5) | (sd 2.98) | |
| | n=8 | n=8 | n=9 | N = 4 | |
| Methadone | .55 | 2.03 | 20.36 | 4.47 | |
| | (sd 1.57) | (sd 5.57) | (sd 51.31) | (sd 9.63) | |
| | n=10 | n=9 | n=9 | n=6 | |
| Naltrexone | 0.33 | 1.37 | 0.19 | 0.44 | |
| | (sd 0.42) | (sd 2.05) | (sd 0.28) | (sd 0.86) | |
| | n=8 | n=9 | n=9 | n=6 | |
| Combined | 2.37 | 16.4 | 42.3 | 8.62 | |
| MOUD | (sd 4.57) | (sd 30.3) | (sd 56.5) | (sd 10.6) | |
| | n=10 | n=10 | n=9 | n=6 | |
| Census Counts | s of MOUD | | | | |
| | Low Coaching | g | High Coachir | ng | |
| | ECHO | No ECHO | ECHO | No ECHO | |
| Buprenor- | 117.62 | 60.57 | 104.07 | 36.50 | |
| phine | (sd 190.42) | (sd 105.31) | (sd 145.32) | (sd 45.29) | |
| | n=6 | n=9 | n=8 | n=7 | |
| Methadone | 0.08 | 0.94 | 98.73 | 56.58 | |
| | (sd 0.25) | (sd 1.80) | (sd 216.36) | (sd 158.40) | |
| | n=9 | n=9 | n=9 | n=8 | |
| Naltrexone | 2.60 | 3.21 | 0.24 | 5.81 | |
| | (sd 5.29) | (sd 6.16) | (sd 0.34) | (sd 15.04) | |
| | n = 7 | n=9 | n=8 | n=8 | |
| Combined | 79.5 | 60.1 | 177 | 100 | |
| MOUD | (sd 156) | (sd 105) | (sd 235) | (sd 207) | |
| | n=10 | n=9 | n=9 | n=8 | |

Monthly mean counts and standard deviations of new and census counts for MOUD across different intervention phases

the high-dose coaching condition compared to the low-dose coaching condition for new MOUD, with an estimated difference of 18.622 (p=0.124) during the intervention phase and 27.665 (p=0.220) during the sustainability phase. While these differences do not meet the conventional threshold for statistical significance (alpha=0.05), this may be due to the moderate sample size and variability across sites. Similarly, average MOUD counts were higher among jails with CBTP than those without new MOUD, with estimated differences of 12.171 and 33.357 in the intervention and sustainability phases, respectively. We acknowledge that the generalizability of these findings is limited, and these results underscore the need for caution when considering the implementation of interventions across diverse settings.

Discussion

Individuals recently released from incarceration face a significantly higher risk of overdose and overdose death [7], leading to considerable research on and advocacy for increased MOUD use in both incarcerated settings and upon release [16, 42–45]. However, as recently as 2018, less than 1% of jails and prisons provided MOUDs [46], underscoring a critical gap in addressing this urgent public health need. Robust implementation strategies are needed to address the persistent gaps in MOUD use in criminal justice settings. Coaching is an established EBI [38, 47, 48], while ECHO is quickly developing an evidence base for supporting EBI implementation [22, 39]. The coaching implementation strategy and ECHO present new opportunities to apply strategies to impact the use of targeted pharmacotherapies [21, 22, 27]. This trial aimed to determine whether more efficient approaches to coaching could be achieved through low-dose coaching and by adding the ECHO implementation strategy to the comparative effectiveness trial. The trial sought to validate ECHO's emerging evidence base and create a greater contextual understanding of the ECHO strategy's effectiveness.

In this comparative effectiveness trial, the study hypothesis that the arm with high-dose NIATx coaching and ECHO would outperform the other three arms was rejected. This finding revealed two informative findings: 1) the no-ECHO arms performed as well as the ECHOarms regarding the impact on using medications; and 2) the low-dose coaching arms (quarterly coach calls) performed as well as the high-dose coaching arms (monthly coach calls). In both arms, plan-do-study-act (PDSA) activities were an active component in making the organizational environment more receptive to MOUD use. PDSA activities typically focused on leadership support as needed, funding for MOUD, stigma reduction, screening for OUD, referring individuals for treatment, ensuring access to MOUD prescribers, maintaining MOUD availability for patient use, administration, implementing diversion prevention processes for buprenorphine, and establishing referral processes to community providers.

Although no significant effects were detected by treatment arm, sites consistently demonstrated increases in MOUD patient counts per month during the intervention phase (*new* measure: 0.538, p = 0.002; *census* measure: 1.912, p < 0.001). Notably, all sites received some level of coaching—either high or low dosage. Although there was no significant difference between low and high-dose coaching, high-dose coaching had a greater effect on MOUD use. A possible explanation for these

| | New Counts of | MOUD | | | | | | | |
|--------------------|-----------------------|----------------------------|---------|------------------------------|------------------------------|---------|---------|---------|--|
| | Intervention P | Intervention Phase (12 Ms) | | | Sustainability Phase (12 Ms) | | | | |
| | Annual Est. Change | <i>t</i> -value | P-Value | n sites | Annual Est. Change | T-Value | P-Value | n sites | |
| Combined MOUD | 6.456 | 3.175 | .002 | 35 | 1.836 | 0.698 | .485 | 30 | |
| Buprenorphine | 4.560 | 3.374 | <.001 | 29 | 7.704 | 3.380 | <.001 | 25 | |
| Methadone | 2.484 | 1.599 | .111 | 34 | -4.524 | -2.453 | .015 | 29 | |
| Naltrexone | 0.204 | 1.190 | .235 | 32 | -0.240 | -1.174 | .241 | 27 | |
| Baseline Intercept | 13.604 | | | | 25.160 | | | | |
| | Census Counts of MOUD | | | | | | | | |
| | | | | Sustainability Phase (12 Ms) | | | | | |
| | Annual Est. Change | T-Value | P-Value | n sites | Annual Est. Change | T-Value | P-Value | n sites | |
| Combined MOUD | 22.944 | 4.365 | < .001 | 36 | 7.404 | 2.012 | .045 | 31 | |
| Buprenorphine | 10.260 | 4.150 | < .001 | 30 | 13.236 | 4.812 | < .001 | 27 | |
| Methadone | 3.864 | 1.565 | 0.118 | 35 | -04.644 | -1.780 | .076 | 31 | |
| Naltrexone | 0.876 | 2.348 | 0.020 | 32 | 1.032 | 2.367 | 0.019 | 26 | |
| Baseline Intercept | 47.423 | | | | 72.431 | | | | |

Monthly estimated changes based on linear-mixed effects models for patient MOUD utilization trends across the intervention and sustainability phases over 12 months

Table 5 Comparative implementation strategy effectiveness

| | New Counts of MOUD | | | | | | | | |
|-------------------------------|----------------------------|---------|-----------------|----|------------------------------|---------|-----------------|----|--|
| | Intervention Phase (12 Ms) | | | | Sustainability Phase (12 Ms) | | | | |
| | Comparative Effectiveness | t-value | <i>p</i> -value | n | Comparative Effectiveness | t-value | <i>p</i> -value | n | |
| High – Low Coaching | 18.622 | 1.577 | .124 | 35 | 27.665 | 1.225 | .220 | 30 | |
| ECHO – no ECHO | 7.915 | 0.655 | .517 | 35 | 9.932 | 0.440 | .663 | 30 | |
| Jails w/CBTP – Jails w/o CBTP | 12.171 | 0.677 | .506 | 23 | 33.357 | 1.028 | .318 | 20 | |
| | Census Counts of MOUD | | | | | | | | |
| | Intervention Phase (12 Ms) | | | | Sustainability Phase (12 Ms) | | | | |
| | Comparative Effectiveness | t-value | <i>p</i> -value | n | Comparative Effectiveness | t-value | <i>p</i> -value | n | |
| High – Low Coaching | 71.613 | 1.178 | .247 | 36 | 96.080 | 1.305 | .202 | 31 | |
| ECHO – no ECHO | 45.960 | 0.747 | .460 | 36 | 60.037 | 0.798 | .432 | 31 | |
| Jails w/CBTP – Jails w/o CBTP | 23.127 | 0.938 | .359 | 23 | 33.758 | 0.641 | .529 | 20 | |

Comparative effectiveness of different implementation strategies on new and census counts for MOUD during the intervention and sustainability phases, with *t*-values, *p*-values, and sample sizes for each comparison

results is that coaching may have positively influenced MOUD patient counts, with low-dose coaching proving to be not more effective, but possibly more efficient than high-dose coaching. That is, given the demands on the workforce in jail environments, the low-dose coaching may be a better option. This may have implications for efforts to use cost-effective and less labor-intensive coaching implementation strategies. Coaching technical assistance was supposed to address administrative and systematic issues, while ECHO technical assistance was supposed to address clinical issues. This distinction did not occur during the implementation of the trial. Clinician-focused ECHO sessions to complement the coaching technical assistance also focused on administrative technical assistance issues. Most ECHO sessions provided case examples of clinical, systemic, and attitudinal barriers the sites encountered. Essentially, these ECHO sessions covered similar issues the coaches were addressing in their sessions. The practical findings from this trial illustrate how medications within the jail setting involves not just clinical issues but also significant system and policy challenges.

ECHO had no impact on MOUD use rates different from non-ECHO, despite evidence showing that ECHO facilitates buprenorphine use [26, 27]. One difference in how ECHO was applied in our trial compared to initial ECHO research [25], our ECHO sessions were conducted monthly versus weekly. Another difference between our trial and other ECHO-intervention trials is that the latter used individual clinicians. In contrast, this study focused on the organizations of jails and/ or community treatment providers. This trial sought adoption and increased use by the jail and/or community provider site overall. It appears that ECHO is less effective for addressing organizational issues; the ECHO intervention seems to work best when there is direct outreach to a particular clinician who has decision-making authority to implement it within their clinical activities. This study informed us that MOUD adoption in jails requires many systematic activities outside the clinician's control that must be addressed, such as screening processes, medication-diversion prevention procedures, and referral to care protocols in the community. A modified version of ECHO may be needed to address justice-related issues, focusing on jail administrators and community health providers, who are the organizational leaders who can impact systematic barriers to MOUD implementation in jails/ CBTPs. Without attention to these MOUD organizational implementation issues, few strides are likely to be made in utilizing MOUD.

Both coaching strategies faced challenges in increasing MOUD use, as improvements were primarily observed in buprenorphine uptake, with limited effects on naltrexone and methadone. This is similar to other trials where all three medications were advanced, and buprenorphine typically became the preferred EBI for implementation [21]. In this jail and/or jail + community provider setting, despite concerns about buprenorphine diversion for nonprescribed use in jail settings, buprenorphine was the preferred MOUD. Buprenorphine was likely preferred over methadone due to regulatory issues that complicate the delivery of methadone. Buprenorphine's popularity is even greater than the monthly injectable naltrexone due to the myriad of issues with injectable naltrexone, such as failure to address cravings for opioids, the injections can be painful, and some individuals do not want to commit to abstinence from opioids or alcohol fully. Other reasons include fear of needles and access to the medication itself.

The limitations of the trial are the following: 1) Like most implementation trials, this trial could have benefitted from a larger sample to increase generalizability. 2) The ability to gain *new* and *census* data from all sites would have strengthened the power of the trial. In addition, 3) Staffing shortages and turnover within the jail impacted some sites' participation in the trial.

Conclusions

For impact on the opioid epidemic, jails are a critical setting where over 11 million pass through the doors each year, including the largest concentration of individuals with OUD. The study demonstrated that increases in buprenorphine use are possible, but other MOUDs present challenges that were not addressed by coaching and ECHO implementation strategies that appear to work in other settings. More research is needed to explore how to address barriers to offering a range of medications, as recommended best practices emphasize providing individuals with choices about the type of medications they prefer. More attention should be given to expanding personal choice issues in efforts to improve morbidity and mortality rates, and to facilitate jails as better providers of substance use services.

The next step is to examine implementation strategies that are more attuned to the organizational cultural issues that jails present. The fact that clinicians used ECHO sessions to obtain technical assistance on the organizational and staffing issues that are unique to jails illustrates a greater need to attend to these issues to facilitate jails as service providers. Historically, jails have been challenging places to deliver behavioral therapies due to the same issues that affect the delivery of medications-low availability of clinical staff, chaotic nature of the jail with rapid turnover, and lack of resources. More attention should be given to understanding the mechanisms of action of organizational strategies to understand better how to achieve optimal implementation results for medication innovation characteristics, active ingredients of implementation strategies, which actors or entities are better positioned to deliver these strategies, and addressing the resource deprivation. With the expansion of 1115 waivers (Medicaid eligibility policies), there is a potential to address the resources needed for evidence-based medications. Determining the implementation strategies to address staffing attitudes, cultural issues, and delivery processes will be a significant hurdle to overcome.

Abbreviations

- CBTP Community-Based Treatment Providers
- CEO Chief Executive Officer
- ECHO Extension for Community Healthcare Outcomes
- MOUD Medication for Opioid Use Disorders (MOUDs)
- OTP Opioid Treatment Program
- OUD Opioid use disorders (OUD)
- PDSA Plan-Do-Study-Act

Acknowledgements

We would like to acknowledge Maureen Fitzgerald for her editorial assistance in preparing the manuscript.

Authors' contributions

All authors (TM, JV, JSK, JZ, LM, JT, LM, and FST) were involved in the inception and writing of the manuscript. TM was the lead author. FST was the research advisor. JSM, JZ, LM, JT led the statistical analysis. All authors read and approved the final manuscript.

Funding

This study was funded under the JCOIN cooperative agreement, funded at the National Institute on Drug Abuse (NIDA) by the National Institutes of Health (NIH). The authors gratefully acknowledge the collaborative contributions of NIDA and support from the following grant awards (U2CDA050097). The contents of this publication are solely the responsibility of the authors and do not necessarily represent the official views of the NIDA, NIH, or the participating sites.

Data availability

The datasets generated and/or analyzed during the current study are not publicly available due to the nature of the data and the confidentiality of sites and participants, but data are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was approved by WCG IRB, with a reference number of #20200548.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Author details

¹ University of Wisconsin, 1513 University Ave, Madison, WI 53706, USA.
² University of Wisconsin, 1025 W. Johnson St, Madison, WI 53706, USA. ³Yale School of Medicine, Section of Infectious Disease, New Haven, CT 06510, USA.
⁴ APT Foundation, New Haven, CT 06511, USA. ⁵George Mason University, 4400 University Dr, Fairfax, VA 22030, USA.

Received: 18 October 2024 Accepted: 7 January 2025 Published online: 03 February 2025

References

- Bronson J, Stroop J, Zimmer S, Berzofsky M. Drug use, dependence, and abuse among state prisoners and jail inmates, 2007–2009. Washington, DC: United States Department of Justice, Office of Juvenile Justice and Delinquency Prevention. 2017.
- 2. National Institute on Drug Abuse. Criminal Justice Drug Facts 2020. Available from: https://nida.nih.gov/publications/drugfacts/criminal-justice.
- Maruschak LM, Minton TD, Zeng Z. Opioid use disorder screening and treatment in local jails, 2019: US Department of Justice, Office of Justice Programs, Bureau of Justice ...; 2023.
- Martin RA, Alexander-Scott N, Berk J, Carpenter RW, Kang A, Hoadley A, et al. Post-incarceration outcomes of a comprehensive statewide correctional MOUD program: a retrospective cohort study. Lancet Reg Health Am. 2023;18: 100419.
- 5. National Academies of Sciences E. Medications for Opioid Use Disorder Save Lives. Mancher M, Leshner AI, editors. Washington (DC). 2019.
- Flanagan Balawajder E, Ducharme L, Taylor BG, Lamuda PA, Kolak M, Friedmann PD, et al. Factors Associated With the Availability of Medications for Opioid Use Disorder in US Jails. JAMA Netw Open. 2024;7(9): e2434704.
- Calcaterra S, Glanz J, Binswanger IA. National trends in pharmaceutical opioid related overdose deaths compared to other substance related overdose deaths: 1999–2009. Drug Alcohol Depend. 2013;131(3):263–70.

- Binswanger IA, Stern MF, Deyo RA, Heagerty PJ, Cheadle A, Elmore JG, et al. Release from prison–a high risk of death for former inmates. N Engl J Med. 2007;356(2):157–65.
- Lam JA, Lee HIS, Truong AQ, Macmadu A, Clarke JG, Rich J, et al. Brief video intervention to improve attitudes throughout medications for opioid use disorder in a correctional setting. J Subst Abuse Treat. 2019;104:28–33.
- Korthuis PT, McCarty D, Weimer M, Bougatsos C, Blazina I, Zakher B, et al. Primary care-based models for the treatment of opioid use disorder: a scoping review. Ann Intern Med. 2017;166(4):268–78.
- Tilmon SJ, Lee KK, Gower PA, West KSH, Mittal K, Ogle MB, et al. Impact of an Urban Project ECHO: Safety-Net Clinician Self-Efficacy Across Conditions. Am J Prev Med. 2023;64(4):535–42.
- Grella CE, Ostile E, Scott CK, Dennis M, Carnavale J. A Scoping Review of Barriers and Facilitators to Implementation of Medications for Treatment of Opioid Use Disorder within the Criminal Justice System. Int J Drug Policy. 2020;81: 102768.
- Crotty K, Freedman KI, Kampman KM. Executive Summary of the Focused Update of the ASAM National Practice Guideline for the Treatment of Opioid Use Disorder. J Addict Med. 2020;14(2):99–112.
- Ferguson WJ, Johnston J, Clarke JG, Koutoujian PJ, Maurer K, Gallagher C, et al. Advancing the implementation and sustainment of medication assisted treatment for opioid use disorders in prisons and jails. Health & justice. 2019;7(1):19.
- 15. Rogers D. The Case for MAT in Jails and Prisons: Research shows medication-assisted treatment for opioid withdrawal works, but challenges and obstacles slow its progress. Corrections Forum. 2021;29(2):32–8.
- 16. Friedmann PD, Hoskinson R, Gordon M, Schwartz R, Kinlock T, Knight K, et al. Medication-assisted treatment in criminal justice agencies affiliated with the criminal justice-drug abuse treatment studies (CJ-DATS): availability, barriers, and intentions. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2012;33(1):9–18.
- U.S. Department of Health and Human Services SAaMHSA, Center for Behavioral Health Statistics and Quality. (2019). Medication-Assisted Treatment (MAT) in the Criminal Justice System: Brief Guidance to States.; 2019. Report No.: PEP19-MATBRIEFCJS.
- Macmadu A, Goedel WC, Adams JW, Brinkley-Rubinstein L, Green TC, Clarke JG, et al. Estimating the impact of wide scale uptake of screening and medications for opioid use disorder in US prisons and jails. Drug Alcohol Depend. 2020;208: 107858.
- Healthcare NCoC. Opioid use disorder treatment in correctional settings. 2021.
- Scott CK, Grella CE, Dennis ML, Carnevale J, LaVallee R. Availability of best practices for opioid use disorder in jails and related training and resource needs: findings from a national interview study of jails in heavily impacted counties in the U.S. Health Justice. 2022;10(1):36.
- Molfenter T, Kim H, Kim JS, Kisicki A, Knudsen HK, Horst J, et al. Enhancing Use of Medications for Opioid Use Disorder Through External Coaching. Psychiatr Serv. 2022:appips202100675.
- Salvador JG, Myers OB, Bhatt SR, Jacobsohn V, Lindsey L, Alkhafaji RS, et al. Association of MOUD ECHO Participation on Expansion of Buprenorphine Prescribing in Rural Primary Care. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2023;44(4):282–91.
- Anderson JB, Martin SA, Gadomski A, Krupa N, Mullin D, Cahill A, et al. Project ECHO and primary care buprenorphine treatment for opioid use disorder: Implementation and clinical outcomes. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2022;43(1):222–30.
- 24. Moore PQ, Tilmon S, Chhabra N, McCabe DJ, Aks SE, Johnson D, et al. Applying Project ECHO (Extension for Community Health Care Outcomes) to improve addiction care in rural emergency departments. AEM Educ Train. 2022;6(5): e10804.
- 25. Komaromy M, Duhigg D, Metcalf A, Carlson C, Kalishman S, Hayes L, et al. Project ECHO (Extension for Community Healthcare Outcomes): A new model for educating primary care providers about treatment of substance use disorders. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2016;37(1):20–4.

- Koester M, Motz R, Porto A, Reyes Nieves N, Ashley K. Using Project Extension for Community Healthcare Outcomes to Enhance Substance Use Disorder Care in Primary Care: Mixed Methods Study. JMIR Med Educ. 2024;10: e48135.
- Tran L, Feldman R, Riley T 3rd, Jung J. Association of the Extension for Community Healthcare Outcomes Project With Use of Direct-Acting Antiviral Treatment Among US Adults With Hepatitis C. JAMA Netw Open. 2021;4(7): e2115523.
- Walker AF, Cuttriss N, Haller MJ, Hood KK, Gurka MJ, Filipp SL, et al. Democratizing type 1 diabetes specialty care in the primary care setting to reduce health disparities: project extension for community healthcare outcomes (ECHO) T1D. BMJ Open Diabetes Res Care. 2021;9(1).
- Mazurek MO, Parker RA, Chan J, Kuhlthau K, Sohl K, Collaborative EA. Effectiveness of the Extension for Community Health Outcomes Model as Applied to Primary Care for Autism: A Partial Stepped-Wedge Randomized Clinical Trial. JAMA Pediatr. 2020;174(5): e196306.
- Englander H, Patten A, Lockard R, Muller M, Gregg J. Spreading Addictions Care Across Oregon's Rural and Community Hospitals: Mixed-Methods Evaluation of an Interprofessional Telementoring ECHO Program. J Gen Intern Med. 2021;36(1):100–7.
- Okunseri C, Boss D, Jacobson N, Wang MV, Szabo A, Okunseri E, et al. Test of an organizational change model to reduce no-shows in dental care settings. Journal of public health dentistry. 2021.
- Molfenter T, Kim JS, Zehner M. Increasing engagement in post-withdrawal management services through a practice bundle and checklist. J Behav Health Serv Res. 2021;48(3):400–9.
- 33. Garner B, Gotham H, Chaple M, Martino S, Ford J, Roosa M, et al. The implementation & sustainment facilitation strategy improved implementation effectiveness and intervention effectiveness: results from a clusterrandomized type 2 hybrid trial. Implementation Research and Practice. 2020.
- Fleddermann K, Jacobson N, Horst J, Madden LM, Haram E, Molfenter T. Opening the "black box" of organizational coaching for implementation. BMC Health Serv Res. 2023;23(1):106.
- Cannon-Bowers JA, Bowers CA, Carlson CE, Doherty SL, Evans J, Hall J. Workplace coaching: a meta-analysis and recommendations for advancing the science of coaching. Front Psychol. 2023;14:1204166.
- Assefa MT, Ford JH 2nd, Osborne E, McIlvaine A, King A, Campbell K, et al. Implementing integrated services in routine behavioral health care: primary outcomes from a cluster randomized controlled trial. BMC Health Serv Res. 2019;19(1):749.
- Taxman FS, Henderson C, Young D, Farrell J. The impact of training interventions on organizational readiness to support innovations in juvenile justice offices. Adm Policy Ment Health. 2014;41(2):177–88.
- Gustafson DH, Quanbeck AR, Robinson JM, Ford JH 2nd, Pulvermacher A, French MT, et al. Which elements of improvement collaboratives are most effective? A cluster-randomized trial Addiction. 2013;108(6):1145–57.
- Puckett HM, Bossaller JS, Sheets LR. The impact of project ECHO on physician preparedness to treat opioid use disorder: a systematic review. Addict Sci Clin Pract. 2021;16(1):6.
- Scott CK, Dennis ML, Grella CE, Mischel AF, Carnevale J. The impact of the opioid crisis on U.S. state prison systems. Health Justice. 2021;9(1):17.
- Molfenter T, Kim JS, Quanbeck A, Patel-Porter T, Starr S, McCarty D. Testing use of payers to facilitate evidence-based practice adoption: protocol for a cluster-randomized trial. Implement Sci. 2013;8:50.
- Evans EA, Wilson D, Friedmann PD. Recidivism and mortality after in-jail buprenorphine treatment for opioid use disorder. Drug Alcohol Depend. 2022;231: 109254.
- Moore KE, Roberts W, Reid HH, Smith KMZ, Oberleitner LMS, McKee SA. Effectiveness of medication assisted treatment for opioid use in prison and jail settings: A meta-analysis and systematic review. J Subst Abuse Treat. 2019;99:32–43.
- Lee JD, Friedmann PD, Kinlock TW, Nunes EV, Boney TY, Hoskinson RA Jr, et al. Extended-Release Naltrexone to Prevent Opioid Relapse in Criminal Justice Offenders. N Engl J Med. 2016;374(13):1232–42.
- Lee JD, Rich JD. Opioid pharmacotherapy in criminal justice settings: now is the time. SAGE Publications Sage CA: Los Angeles, CA; 2012. p. 1–4.
- Vestal C. New momentum for addiction treatment behind bars. Pew Stateline Retrieved from https://www.pewtrusts.org/en/research-andanalysis/blogs/stateline/2018/04/04/new-momentum-for-addiction-treat ment-behind-bar. 2018.

- Molfenter T, Connor T, Ford J, Hyatt J, Zimmerman D. Reducing psychiatric inpatient readmissions using an organizational change model. WMJ. 2016;115(3):122–8.
- Kirchner JE, Ritchie MJ, Pitcock JA, Parker LE, Curran GM, Fortney JC. Outcomes of a partnered facilitation strategy to implement primary caremental health. J Gen Intern Med. 2014;29(Suppl 4):904–12.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.